SIEMENS

RECEIVED
CENTRAL FAX CENTER
APR 13 2007

FACSIMILE COVER SHEET

In the UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Roswell J. Ruka

Application No. **10/663,949** Atty. Docket No: 2003P07614US

Filed: 09/16/2003

Title: PLASMA SPRAYED CERAMIC-METAL FUEL ELECTRODE

Examiner: Keith D. Walker Art Unit: **1745**

➨ **FACSIMILE ATTN TO: Keith D. Walker** **FAX NO.: 571-273-8300**

REPLY BRIEF IN RESPONSE TO EXAMINER'S ANSWER

Commissioner for Patents
Alexandria, VA 22313

Certificate of Transmission under 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the Patent and Trademark Office on April 13, 2007.

Barbara Quinn

Barbara Quinn
Typed or printed name of person signing Certificate

Note: Each paper must have its own certificate of transmission, or this certificate must identify each submitted paper.

This facsimile cover sheet which includes a Certificate of Transmission under 37 CFR 1.8 (1 pg)
PTO/SB/21 Transmittal (1 pg)
Response to Examiner's Answer bearing "date mailed" of 03/15/2007 (8 pgs)

Number of pages being transmitted (including this cover sheet): 10 pgs

Siemens Corporation

Legal and Intellectual Property Department
4400 Alafaya Trail
Orlando Florida 32826
Tel: 407-736-2472
FAX: 407-736-6440

RECEIVED
CENTRAL FAX CENTER

APR 13 2007

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission: 10

Application Number	10/663,949
Filing Date	September 16, 2003
First Named Inventor	Roswell J. Ruka
Art Unit	1745
Examiner Name	Keith D. Walker
Attorney Docket Number	2003P07614US

ENCLOSURES *(check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☒ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:

Facsimile Cover Sheet including a certificate of transmission under 37 CFR 1.8

Remarks

Appellants' Reply Brief in response to Examiner's Answer bearing date mailed of 03-15-2007

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm	SIEMENS		
Signature			
Printed Name	John P. Musone		
Date	April 13, 2007	Reg. No.	44,961

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Signature			
Typed or printed name	Barbara Quinn	Date	April 13, 2007

SIEMENS

PATENT
Attorney Docket No. 2003P07614US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Inventor:	R. Ruka et al.	Group Art Unit:	1745
Serial No.:	10/663,949	Examiner:	K. Walter
Filed:	September 16, 2003		

Title: PLASMA SPRAYED CERAMIC-METAL FUEL ELECTRODE

Commissioner For Patents
PO BOX 1450
Alexandria, VA. 222313-1450

Sir:

APPELLANTS' REPLY BRIEF

Pursuant to 37 C.F.R. § 1.193(b), this Reply Brief is responsive to the Examiner's Answer mailed March 15, 2007. Appellants reply as follows:

(1 and 2) Claims 1-4, 9-12 and 15-17 stand rejected under 35 U.S.C. § 102(b)/103(a), the Examiner contending that these claims are anticipated or rendered obvious by Ramanarayanan.

Response to Product-By-Process Contention

The Examiner's Answer is based on a brand new interpretation of Applicant's claimed invention, never previously set forth during prosecution. The Examiner now contends that claim 1 is a product-by-process claim and thus it is not necessary to find prior art that discloses or suggests the otherwise distinguishing microstructure limitation. Claim 1 recites:

> 1. A tubular solid oxide fuel cell, comprising:
>
> an air electrode;
> an electrolyte formed on at least a portion of the air electrode; and
> a ceramic-metal fuel electrode having a *microstructure characterized by accumulated molten particle splats* formed on at least a portion of the electrolyte.

Claim 1 is a product claim, not a product-by-process claim. Support for this is found in the renowned patent treatise *Landis on Claim Drafting* and case law.

> A product-by-process claim is one where an article or at least one element of an article is claimed by reciting the process for fabricating the article or its element. Typically, the article or element is recited in the form of a method claims or a method limitation, preferably using the gerund from for the process step in which the product or its element is formed. The simplest form of such a claim might be: 5C. Sodium hydroxide produced according to the process of claim 5B.

Robert C. Faber, *Landis on Mechanics of Patent Claim Drafting*, § 46. Landis further explains this distinction through analysis of pertinent case law:

> *Steppan*, cited in *Pilkington*, involved a claim to:
>
> > 25. An acid phosphate of a *condensation product* of formaldehyde with a salt of a compound selected from the group consisting of . . . [A and B], the acid phosphate having the general formula . . . [C]. (emphasis in Landis)
>
> . . .
>
> As to claim 25, the court held it was not a product-by-process claim at all. Words, such a "condensation product," while telling the process (condensation) are not purely process limitations; they are also structural.
>
> . . .
>
> Some apparent process limitations, such as "etched," "welded," "interbonded by interfusion," are considered structural limitations not subject to the product-by-process rules. See *In re Garnero*, where the following claim was considered:
>
> > A composite porous, thermal insulation panel characterized by dimensional stability and structural strength consisting essentially of expanded perlite particles which are *interbonded to one another by*

> *interfusion* between the surfaces of the perlite particles *while in a pyroplastic state* to form a porous perlite panel. (emphasis in Landis)

The court held that:

> The recitation of the particles as "interbonded one to another by interfusion between the surfaces of the perlite particles" is as capable of being construed as a structural limitation as "intermixed," "ground in place," "press fitted," "etched," and "welded," all of which at one time or another have been separately held capable of construction as structural, rather than process limitations.

Robert C. Faber, *Landis on Mechanics of Patent Claim Drafting*, § 46.

The above-discussed cases demonstrate that claim terms which recite the structural end state of some transformational activity (rather than the transforming activity itself) are considered to be product claims. Thus, like the terms "condensation product" and "interbonded to one to another by interfusion," the term "microstructure characterized by accumulated molten particle splats" is properly held as structure - not process. To somehow interpret microstructure as process simply because "the final product, a fuel electrode, is not in a molten state", as the Examiner does, is irrelevant and improper.

Moreover, original claim 1 recited a plasma-sprayed ceramic-metal fuel electrode. This limitation was amended to the present language in response to the Examiner's interpretation that the recitation of "plasma sprayed" rendered the claim a product-by-process claim. In response to this amendment and prior to the Examiner's Answer, the Examiner correctly concluded that the amended claim was a product claim. Now, apparently appreciating the fact that the prior art does not teach or suggest this microstructure limitation, the Examiner seeks to improperly sidestep this limitation by contending that it is a product-by-process.

Response to Contention that Ramanarayanan Teaches and/or makes Obvious the Microstructure Limitation

In addition to the Examiner's brand new product-by-process argument, the Examiner continues the same contention that "the Ramanarayanan reference does teach plasma spraying

and teaches the method to be a more cost effective method than electrochemical vapor deposition," citing page 23 bottom col. 3 – page 24 top col 1.

As Applicant has repeatedly explained and the Examiner has continually ignored, Ramanarayanan does not teach or suggest a fuel electrode having a microstructure characterized by accumulated molten particle splats (which would be caused by plasma spraying). Rather, Ramanarayanan page 23 last paragraph discloses that the electrolyte is deposited by EVD, and mentions that depositing the electrolyte by more cost-effective non-EVD techniques, such as plasma spraying or colloidal/electrophoric deposition followed by sintering, is being investigated (but not by whom). Moreover, Ramanarayanan page 24 first paragraph discloses that the anode (fuel electrode) is deposited by electrochemical vapor deposition (EVD), not plama spraying.

Appreciating that Ramanarayanan does not actually teach the claimed fuel electrode having a microstructure characterized by accumulated molten particle splats (which would be caused by plasma spraying), the Examiner continues "Appellant argues no parameters for plasma spraying are given in the reference and so one skilled in the art would not know how to plasma spray the fuel electrode. However, it is held that the plasma spraying technique is well known in the art and it would be obvious to one skilled in the art at the time of the invention to use the plasma spraying technique".

This reasoning improperly presumes that Ramanarayanan's passing reference to an investigation into plasma spraying the electrolyte is sufficiently enabling to teach how to plasma spray the fuel electrode onto the underlying electrolyte without undue experimentation. MPEP 2121 states:

> The disclosure in the assertedly anticipating reference must provide an enabling disclosure of the desired subject matter; mere naming or description of the subject matter is insufficient, if it cannot be produced *without undue experimentation*. Elan Pharm., Inc. v. Mayo Found. For Med. Educ. & Research, 346 F.3d 1051, 1054, 68 USPQ2d 1373, 1376 (Fed. Cir. 2003). (emphasis added)

Ramanarayanan does not disclose or even hypothesize any of the requisite steps or parameters necessary for plasma spraying the electrolyte, let alone for the much more complex fuel electrode. Ramanarayanan does not disclose or even hypothesize how plasma spraying the

fuel electrode could achieve the difficult to obtain adherence, thermal stability, cyclibility etc. properties necessary for a functional fuel electrode. But perhaps most telling of Ramanarayanan's lack of enabling disclose for plasma spraying the fuel electrode is that Ramanarayanan explains that "the tubular design [was] pioneered by Siemens Westinghouse Power Corporation." (page 23 last para), yet it took Siemens Westinghouse's highly skilled pioneering engineers nearly two years to develop the plasma sprayed fuel electrode once they initiated such efforts. See Section 131 Declarations. For at least these reasons, Ramanarayanan's passing reference to an investigation into plasma spraying the electrolyte certainly does not teach how to plasma spray the fuel electrode onto the underlying electrolyte without undue experimentation.

Moreover, Applicants made these same arguments to the same rejection in its first appeal, and the Examiner found them to be persuasive. The only new contention that the Examiner now makes is that Applicant's claim in now construed as a product-by-process claim (discussed above) and that Ramanarayanan inherently discloses plasma spraying the fuel electrode (discussed in the Appeal Brief).

(3) Claims 1-8 and 12-18 stand rejected under 35 U.S.C. § 103(a), the Examiner contending that these claims are obvious over Cable in view of what would have been obvious to one skilled in the art.

Cable does not teach or suggest a tubular fuel electrode having a microstructure characterized by accumulated molten particle splats (which would be caused by plasma spraying), as contended by the Examiner. Rather, Cable 8:30-35 teaches that a very thin fuel electrode interfacial layer 19, not the fuel electrode 4 may be formed by other techniques such as plasma deposition, spin casting, spraying or screen printing. Cable also goes into significant detail teaching away and distinguishing its planar fuel cell design from the claimed tubular fuel cell design, explaining that its invention is directed to fuel cells which are tolerant of sulfur-bearing fuels (1:15-17) and that tubular fuel cells are intolerant of sulfur bearing fuels (1:25-30, 1:55-2:59).

The Examiner's Answer contends that "disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments," citing MPEP 2124(II). While Applicants agree that disclosed examples and preferred embodiments do not constitute a teaching away, Applicants respectfully submit that this point of law not relevant to the instant issue. The basis from which Applicants contend that Cable teaches away is not "disclosed examples and preferred embodiments," but rather statements made in Cable that discourage those skilled in the art from using Cable in connection with sulfur fuel intolerant tubular fuel cells. For example, col. 1 line55 – col. 2 line 59 recite:

> Cerment electrodes for *cofired, or bonded, solid oxide electrochemical fuel cells, preferably tubular in shape, are disclosed in U.S. Pat. No. 4,582,766 to Isenberg et a. (Westinghouse Electric Company).*
>
> . . .
>
> *The cofired or bonded solid oxide electrolyte fuel cells have practically no tolerance to sulfur bearing fuels.* The performance of the cofired or bonded solid oxide electrolyte fuel cells degrades considerably when used in a process to utilize sulfur bearing fuels, even at concentrations as low as 1 part per million (ppm).
> *The performance degradation experienced using sulfur bearing fuels with cofired or bonded solid oxide fuel cells prompted Westinghouse to modify the anode bonded to the electrolyte* by coating the anode with a gas permeable oxygen-ionic-electronic conductor material coating which was sinter or diffusion attached, disclosed in U.S. Pat. Nos. 4,702,971 and 4,812,329.
>
> . . .
>
> *It is an object of the present invention, therefore, to provide a fuel cell capable of utilizing sulfur bearing fuels with stable operating performance over extended periods of time.*

Cable further explains at Col 5 lines 17-62 that:

> *We have found that nonbonded solid electrolyte fuel cells can utilize sulfur bearing fuels with surprisingly stable performance over extended periods of time... We have further found that solid electrolyte fuel cells having nonbonded electrodes respond differently to sulfur than do bonded or cofired fuel cells. Bonded fuel cells such as those described in the Westinghouse*

> *publications, exhibit a continued decrease in performance* so long as sulfur bearing fuel is utilized
> ...
> *The present invention therefore provides* a process for utilizing a sulfur bearing fuel in an electrochemical apparatus including introducing a fuel containing at least about 2 ppm sulfur species, at reaction temperature, *into a nonbonded solid electrolyte fuel cell*, and reacting said fuel.

MPEP 2142.02 VI requires that "a prior art reference *must* be considered in its entirety, i.e. as a whole, including portions that would lead away from the claimed invention." Because the Examiner has admittingly not considered the portions of Cable that teach away, the rejection must fail.

The Examiner further contends that it would be obvious "to recognize plasma spraying as a viable option for also applying the anode material." However, the Examiner provides no motivation in Cable to support this contention. Applicants therefore respectfully that the Examiner has failed to set forth a proper 103(a) rejection, and also repeats the motivation argument set forth above in connection with Ramanarayanan 103(a) rejection.

The Examiner also rejected claims 13 and 14 but fails to identify where Cable discloses or suggests a fuel electrode comprising at least 7 or 8 mole percent of yttria. The Examiner's Answer, for the first time, identifies col. 8 lines 11-15 as disclosing this claim limitation. However, col. 8 lines 11-15 discloses the electrolyte – not the fuel electrode - having 8-10 mole percent.

Grounds 4-9

Applicants disagree with the Examiner's grounds of rejections 3-9, as provided in Applicants' previously filed Office Actions and expanded upon in Applicants' Appeal Brief.

Conclusion

For the reasons provided in Applicants previously filed Office Actions, expanded upon in Applicants Appeal Brief, and highlighted in this Reply Brief, Applicants respectfully submit that

the rejections set forth in the final Office Action are inapplicable to the pending claims. The honorable Board is therefore respectfully requested to reverse the final rejection of the Examiner and to remand the application to the Examiner with instructions to allow the pending claims. Please grant any extensions of time required to enter this paper. Please charge any appropriate fees due in connection with this paper or credit any overpayments to Deposit Acct. No. 19-2179.

Respectfully submitted,

Dated: 4/13/07

By: _____

John P. Musone
Registration No. 44,961
(407) 736-6449

Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, New Jersey 08830